

GEOLOGY

Physiographic Region

The Elk River basin lies entirely within the Ozark Plateau physiographic region and is further delineated as being in the Springfield Plateau region (Vandike 1995). Thom and Wilson (1980) included the Elk River basin in the Ozark Plateau natural division of Missouri.

The Springfield Plateau is an area characterized by rolling uplands with elevations ranging from 1,000 to 1,700 feet mean sea level as you proceed from the Oklahoma/Kansas border eastward into Missouri. Karst features occur throughout the Springfield Plateau. Stream dissection provides localized relief of up to 400 feet (MDNR 1986).

Geology and Soils

The bedrock in the basin is primarily Mississippian in origin and consists of limestones, shales, and sandstones (MDNR 1986). The two primary rock types encountered are chert containing limestones and shale. The deepest incised major tributaries cut into shales from the Devonian time period (MDNR 1985). Figure 7 is a general map of the geology in the Elk River basin.

Karst is any terrain based on a layer of soluble bedrock, most often carbonate rocks such as limestones. Karst areas are distributed throughout the basin. Lost Creek and the headwaters area of Buffalo Creek are located in the northernmost karst area in the basin. Another area of karst topography starts around Noel, Missouri and projects south between Otter and Butler creeks. This area continues across the border into Arkansas. A third area of karst geology is found where the confluence of Trent Creek and Big Sugar Creek occurs (MDNR 1986). This presence of Karst topography results in the losing streams, caves, and springs found scattered throughout the basin.

The large area of dolomitic rock beneath the Elk River basin is capable of storing large quantities of groundwater. This groundwater is frequently released to the surface as springs. A large number of springs are found throughout the Elk River basin (Figure 8).

The four soil associations found over the majority of the Elk River basin are Gerald-Creldon-Hoberg-Keeno, Viraton-Wilderness, Nixa-Clarksville, and Gasconade-Opequon-Clarksville. These are a mixture of Ozark and Ozark Border soil types (Allgood and Persinger 1979). Gerald-Creldon-Hoberg-Keeno association soils are "moderately well drained and somewhat poorly drained, loamy and clayey, gently sloping to strongly sloping upland soils that have fragipans." Viraton-Wilderness association soils are "gently sloping, moderately well drained and well drained, loamy, cherty upland soils with fragipans." Nixa-Clarksville association soils are "gently sloping to very steep, moderately well drained to somewhat excessively drained upland soils that have fragipans or cherty subsoils." Gasconade-Opequon-Clarksville association soils are "shallow and deep, gently sloping to steep, loamy and clayey, well drained and somewhat excessively drained upland soils"(Allgood and Persinger 1979). Basically, the soils in the basin tend to be shallow and rocky and most of the terrain is hilly.

Figure 07. Elk River basin geology.

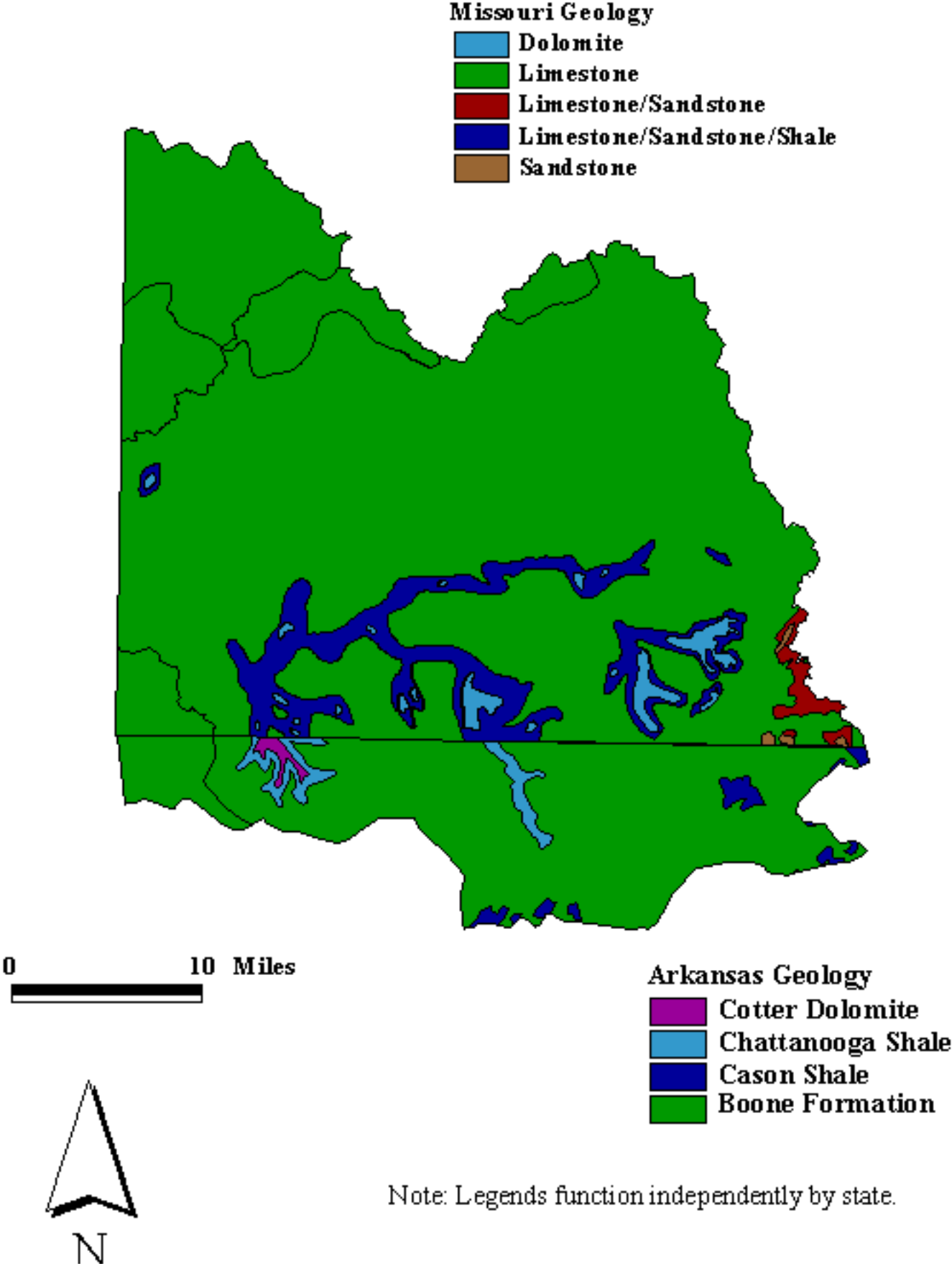
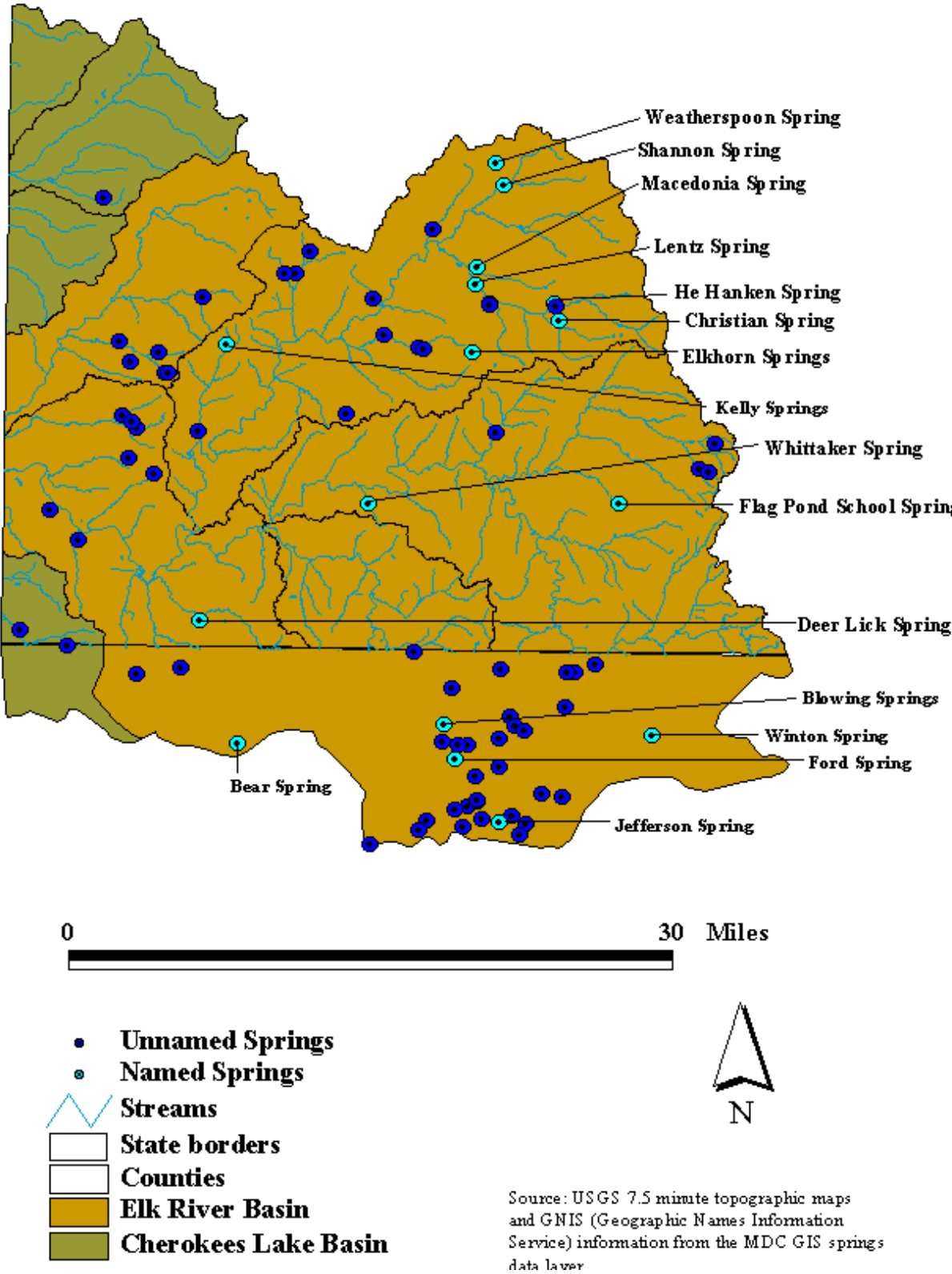


Figure 08. Springs of the Elk River basin.



Detailed descriptions of county soils are available from the USDA-SCS for Barry and Newton counties. The soil survey for McDonald County is not complete at this time, but is in progress and should be published between 2003 and 2005 (USDA-NRCS, pers. comm.). Soils in the Elk River basin are generally low in fertility and tend to be acidic.

The headwaters of the Elk River basin in Newton County (Lost Creek and Buffalo Creek systems) originate in level uplands that are Gerald-Creldon association soils. They then flow through sloping uplands of Nixa-Tonti and Nixa-Clarksville association soils. Bottom land areas are primarily Huntington-Secesh association soils (USDA-SCS 1989).

The headwaters of the Elk River basin in Barry County are found in two major tributaries. Big Sugar Creek headwaters originate in the Clarksville-Noark-Nixa soil association and flow into the Hailey-Rock outcrop association. These are moderate to steeply sloping associations in the Ozark highland area. Indian Creek headwaters originate in Scholten-Tonti association and Hoberg-Creldon-Keeno association soils of the Ozark Border area. (USDA-SCS 1992).

Watershed Area

The Elk River basin encompasses 1,032 square miles of which 866 square miles (84%) are in Missouri (MDNR 1985). Moderate winters with long warm summers are the general climate pattern for the Elk River basin. The prevailing winds are southerly and are strongest in the spring season (MCWC 1974). Temperature extremes range from about -20E F to 110E F with an average yearly temperature of 55E F (MDNR 1976).

Stream Order

The Elk River is a sixth order stream where it originates at the confluence of Big Sugar Creek and Little Sugar Creek. It remains a sixth order stream to its mouth, which is inundated by Grand Lake O' the Cherokees in Oklahoma.

Channel Gradient

Gradients in the Elk River basin average 10.3 feet/mile (Barnett et al 1985). Gradients in headwater reaches of the Elk River basin can exceed 200 feet/mile. Elevation ranges from 1,500 feet above mean sea level (msl) near the headwaters to 680' msl at the mouth (Barnett et al 1985). Grand Lake O' the Cherokees inundates the mouth of the Elk River to a level of 739' msl at normal pool and 756' msl at flood pool. Gradient information for streams and rivers third order and larger in the Elk River basin are available from the MDC's Southwest Regional Office in Springfield, Missouri.